

Translation

PATENT COOPERATION TREATY

PCT/JP2003/012146



PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NE-70223WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/JP2003/012146	International filing date (day/month/year) 24 September 2003 (24.09.2003)	Priority date (day/month/year)
International Patent Classification (IPC) or national classification and IPC H01L 21/205, 21/302		
Applicant NEC CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 24 September 2003 (24.09.2003)	Date of completion of this report 02 April 2004 (02.04.2004)
Name and mailing address of the IPEA/JP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP2003/012146

I. Basis of the report

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☐ the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the claims:
pages _____, as originally filed
pages _____, as amended (together with any statement under Article 19
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the drawings:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____
- ☐ the sequence listing part of the description:
pages _____, as originally filed
pages _____, filed with the demand
pages _____, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	4-10, 22-28, 38-48	YES
	Claims	1-3, 11-21, 29-37	NO
Inventive step (IS)	Claims	4-10, 22-28, 39-48	YES
	Claims	1-3, 11-21, 29-38	NO
Industrial applicability (IA)	Claims	1-48	YES
	Claims		NO

2. Citations and explanations

Document 1: JP, 59-065434, A (NEC CORPORATION), 13 April 1984 (13.04.84) (Family: none)
 Document 2: US, 5400740, A (MITSUBISHI CHEMICAL CORPORATION), 28 March 1995 (28.03.95), full text & JP, 5-175150, A
 Document 3: JP, 3-236219, A (SUMITOMO ELECTRIC INDUSTRIES, LTD.), 22 October 1991 (22.10.91), full text (Family: none)
 Document 4: JP, 9-092621, A (OKI ELECTRIC INDUSTRY CO., LTD.), 04 April 1997 (04.04.97), full text (Family: none)
 Document 5: JP, 1-286991, A (FUJITSU LIMITED), 17 November 1989 (17.11.89), page 4, upper left column, lines 15-19 (Family: none)
 Document 6: US, 5679603, A (MITSUBISHI ELECTRIC CORPORATION), 21 October 1997 (21.10.97), column 14, lines 20-41; column 16, lines 3-5; Fig. 8 & JP, 7-263365, A, [0085], [0095]
 Document 7: US, 6336970, B1 (DOWA MINING CO., LTD.), 08 January 2002 (08.01.02), Figs. 1-4 & JP, 2000-124138, A, Figs. 1-4
 Document 8: JP, 2003-282455, A (NEC CORPORATION), 03 October 2003 (03.10.03), full text (Family: none)

Claims 1-3, 11-21, 29-37

The subject matter of claims 1-3, 11-21, and 29-37 is not novel on account of documents 1, 2, and 3 respectively.

Document 1 describes introducing hydrogen chloride for etching and TMGa and AsH₃ for growth, simultaneously removing the surface modified layer or oxide film layer, and then growing an active layer.

Document 2 describes using TMG simultaneously with hydrogen chloride etching gas when etching in order to clean the growth surface immediately before vapor-phase growth of a compound semiconductor thin film.

Document 3 pertains to cleaning a semiconductor surface in advance when epitaxially growing a semiconductor layer on a semiconductor substrate, and describes supplying a gas containing starting material for epitaxial growth and a gas containing a halogen element in a predetermined ratio.

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of Box V:

Claim 38

The subject matter of claim 38 does not involve an inventive step on account of documents 1-3 and document 6.

Document 6 describes supplying HCl gas before growing p-InP layer 3a and thinly and lightly etching the oxidized surface layer when forming a p-InP layer 3 and using a SiO₂ stripe 50 as a mask and removing the SiO₂ stripe 50 and growing the p-InP layer 3a.

Employing the method described in documents 1-3 instead of the light etching step in document 6 would be easy for a person skilled in the art.

Claims 4-10, 22-28, 39-48

The matters specified in claims 4-10, 22-28, and 39-48 are not disclosed in any of the documents cited in the ISR, except for document 8, which has the same applicant as the present application, and is not obvious to a person skilled in the art.